CLAIMS

1. A stethoscope with acoustic-to-electrical transducer for detecting body sounds, the transducer comprising:

a diaphragm mounted in a housing such that the diaphragm can make contact with a body and vibrate in response to body sounds;

a diaphragm displacement-to-electrical conversion means to convert diaphragm displacement due to body sound vibrations to electrical signals; and

the transducer housing having one or more apertures or openings to provide a low-impedance acoustic path for ambient sound to enter the space within the housing including the space behind diaphragm.

2. The transducer according to Claim 1, wherein the apertures can be opened or closed by a user.

3. The transducer according to Claim 1, further comprising a moisture barrier with low acoustic impedance placed between the apertures and the internal housing cavity, such that a low impedance acoustic path for ambient sound to enter the housing cavity is maintained, while moisture and humidity are prevented from entering the cavity.

4. An acoustic-to-electrical transducer for detecting body sounds, the transducer comprising:

a diaphragm displacement-to-electrical conversion means to convert diaphragm displacement due to body sound vibrations to electrical signals, said conversion means mounted in a housing;

a diaphragm separate from the housing such that the diaphragm can make contact with a body and vibrate in response to body sounds and can be attached or adhered to said body;

said conversion means being mounted in said housing such that the transducer can be positioned near the body to detect diaphragm displacement.

5. The transducer according to Claim 4, wherein:

the diaphragm includes a conductive surface or plane connected as one electrode of a capacitive transducer;

the displacement-to-electrical conversion means being a

capacitance-to-electrical conversion means with a capacitive electrode mounted in said housing and connected to a circuit such that the diaphragm conductive surface and capacitive electrode form a capacitance, said capacitance changing in response to diaphragm displacement due to body sound vibration.

6. An acoustic-to-electrical transducer for detecting body sounds, the transducer comprising:

a diaphragm mounted in a housing such that the diaphragm can make contact with a body and vibrate in response to body sounds;

a diaphragm displacement-to-electrical conversion means to convert diaphragm displacement due to body sound vibrations to electrical signals; and

the diaphragm attachment means including a provision for adjustment of diaphragm dynamic characteristics including tension and resonance frequency.

7. An acoustic-to-electrical transducer for detecting body sounds, the transducer comprising:

a diaphragm mounted in a housing such that the diaphragm can make contact with a body and vibrate in response to body sounds;

a diaphragm displacement-to-electrical conversion means to convert diaphragm displacement due to body sound vibrations to electrical signals; and

a second acoustic-to-electrical transducer mounted within housing to convert sound within the housing cavity to an electrical signal.

8. An acoustic-to-electrical transducer for detecting body sounds, the transducer comprising:

a diaphragm having an electrically conductive surface, the diaphragm being mounted in a housing such that the diaphragm can make contact with the body and vibrate in response to body sounds;

a fixed conductive plate substantially parallel to the diaphragm, mounted within the housing, the conductive plate being positioned at a distance from the diaphragm, the diaphragm conductive surface and fixed conductive plate forming two plates of a capacitor and connected in the

form of an electrical capacitance to electrical circuitry;

a capacitance-to-electrical conversion means to convert diaphragm-plate capacitance changes due to body sound vibration to electrical signals; and

a drive circuit connected to diaphragm electrically-conductive surface such that AC signal voltages can be applied to said conductive surface.

9. The transducer according to Claim 8, wherein the AC signals are noise-canceling signals that increase the signal-to-noise ratio of the electrical conversion, where the signal is due to body vibration and the noise is due to ambient sound.

10. The transducer according to Claim 8, wherein the AC signal is a tracking signal to be used for measurement of diaphragm displacement.

11. An acoustic-to-electrical transducer for detecting body sounds, the transducer comprising:

a diaphragm having an electrically conductive surface, the diaphragm being mounted in a housing such that the diaphragm can make contact with the body and vibrate in response to body sounds;

a fixed conductive plate substantially parallel to the diaphragm, mounted within the housing, the conductive plate being positioned at a distance from the diaphragm, the diaphragm conductive surface and fixed conductive plate forming two plates of a capacitor and connected in the form of an electrical capacitance to electrical circuitry;

a capacitance-to-electrical conversion means to convert diaphragm-plate capacitance changes due to body sound vibration to electrical signals;

a drive circuit connected to diaphragm electrically-conductive surface such that AC signal voltages can be applied to said conductive surface;

an ambient sound transducer producing an ambient sound electrical signal; and

a feedback system wherein the ambient sound electrical signal is processed to produce an AC signal that is applied to said diaphragm

conductive surface such that the output signal from the capacitance-to-electrical conversion means due to ambient sound is minimized and signal due to diaphragm displacement is maximized.

12. An acoustic-to-electrical transducer for detecting body sounds, the transducer comprising:

a diaphragm mounted in a housing such that the diaphragm can make contact with a body and vibrate in response to body sounds;

a diaphragm displacement-to-electrical conversion means to convert diaphragm displacement due to body sound vibrations to electrical signals;

an ambient sound transducer producing an ambient sound electrical signal; and

a storage or output means that stores or outputs both the ambient sound electrical signal and the diaphragm displacement transducer signals.

13. An acoustic-to-electrical transducer for detecting body sounds, the transducer comprising:

a diaphragm that is easily exchanged among two or more of the following:

a diaphragm having an electrically conductive surface, the diaphragm being mounted in a housing such that the diaphragm can make contact with the body and vibrate in response to body sounds,

a diaphragm having no electrically conductive surface,

a diaphragm with conductive surface over part of the diaphragm area,

a diaphragm with conductive surface and an hole or opening in the diaphragm,

no diaphragm;

a fixed conductive plate substantially parallel to the diaphragm, mounted within the housing, the conductive plate being positioned at a distance from the diaphragm, the diaphragm conductive surface and fixed conductive plate forming two plates of a capacitor and connected in the form of an electrical capacitance to electrical circuitry;

a capacitance-to-electrical conversion means to convert diaphragm-

plate capacitance changes due to body sound vibration to electrical signals;

14. A electrical audio frequency signal source with one or more output channels connected to one or more corresponding electrodes, to be used in conjunction with a capacitance-to-electrical conversion means, said electrodes mounted on or close to the surface of one of the following objects:

an article of clothing,

a manikin or doll,

a device that can be removably attached to a live or inanimate body,

an adhesive-backed material.

15. The signal source and electrodes as in Claim 14 wherein the capacitance-to-electrical conversion means is a capacitive acoustic-to-electrical transducer for detecting body sounds, the transducer being adapted to detect voltage changes on the electrodes, converting such voltage changes to an audio output signal.

16. The signal source according to Claim 14, wherein the signal source comprises, or can be driven by, one or more of the following:

a computer,

a compact disc or digital video disc DVD player,

an MP3 or solid-state sound storage device.

17. A device for selectively listening to one of many audio signals, the device comprising:

a multi-channel audio signal source connected to electromagnetic output stimulus transducers, said stimulus transducers placed at a multitude of sites on the surface of an object;

an electromagnetic-to-audio signal input transducer connected to an audio output means, said input transducer being sensitive to electromagnetic signals emitted from the stimulus transducers when placed in close proximity to the output stimulus transducers, relative to the distance between said transducers;

the process of selecting a given audio signal by moving the input transducer to a selected stimulus transducer site and placing the input

transducer close to the stimulus transducer such that the audio signal is coupled to the input transducer for reproduction via the audio output means.

5